



Technology Evaluation for Environmental Risk Mitigation Principal Center

Low/No-VOC and Nonchromate Coating System for Support Equipment

JG-PP Project Number: J-99-OC-014

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Project Summary

Primer and topcoat formulations used for Department of Defense (DoD) and National Aeronautics and Space Administration (NASA) aerospace vehicle support equipment often contain hexavalent chromium, lead, Volatile Organic Compounds (VOCs), and Hazardous Air Pollutants such as methyl ethyl ketone (MEK), toluene, and xylene. To eliminate or reduce the environmental, safety, and occupational health issues associated with these hazardous materials, the Low/No-VOC and Nonchromate Coating System for Support Equipment project demonstrated that alternative technologies can meet the performance standards required by the DoD and NASA for their support equipment and that those technologies can be implemented as a coating system. Stakeholders defined support equipment as mobile and fixed, combat- and aviation-related ground equipment in powered and non-powered categories. Powered support equipment included, but was not limited to, avionics, portable/mobile generators, air compressors, hydraulic service units, air conditioners, ground heaters, light carts, gas turbine service equipment, universal maintenance stands, and self-propelled bomblifts. Non-powered support equipment included, but was not limited to, maintenance stands, towbars, oxygen/nitrogen service carts, and jacks.

Eleven primer/topcoat systems such as advanced film technologies, high-solids coatings, metal wire arc spray coatings, powder coatings, and waterborne coatings were selected for laboratory testing. Based on the laboratory testing, completed in June 2001, five systems were selected for field demonstrations. The field demonstration sites included NAS Brunswick, NAS Everett, Cape Canaveral Air Force Station, and Patrick Air Force Base. Final evaluations took place in June 2003. NASA selected one additional coating system specific to NASA requirements for testing. Heat and beach testing are special requirements for NASA qualification/validation of alternative coatings. Kennedy Space Center (KSC) conducted heat testing in December 2001. The test panels intended for beach testing were damaged during transport and deemed unacceptable for test. The beach test report was completed in May 2003. All of the un-topcoated bare zinc primers performed best, the topcoated zinc primer coating systems performed well, while the waterborne and powder coat systems performed poorly. Based on these results, high solids coatings are the best option for corrosion protection in severe marine environments such as KSC. The identification of alternatives that perform well and those that perform badly benefits NASA by eliminating products from future testing that are clearly not suitable while identifying the best candidates for follow-on testing.

NASA aided in the development of the [Joint Test Protocol \(JTP\)](http://www.jgpp.com/projects/support equip/documents/sejtp.pdf) (<http://www.jgpp.com/projects/support equip/documents/sejtp.pdf>) and selection of alternatives to include NASA substrates. Based on results of the project, Stennis Space Center, is applying one of the alternatives to structures, and elements of the Space Shuttle are identifying potential alternatives for future testing. Further investigation of non-hazardous, low-VOC coating systems may provide an enhanced performing corrosion protection option in harsh environments.